

(PCT Article 36 and Rule 70)

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2004/052316

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 2-11 as originally filed/furnished
- pages* 1, 1a received by this Authority on 28.07.2005 with letter of 28.07.2005
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. 1-10 as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* _____ received by this Authority on _____
- nos.* _____ received by this Authority on _____
- ☒ the drawings:
- sheets 1/4-4/4 as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-10</u>	YES
	Claims	<u></u>	NO
Inventive step (IS)	Claims	<u>1-10</u>	YES
	Claims	<u></u>	NO
Industrial applicability (IA)	Claims	<u>1-10</u>	YES
	Claims	<u></u>	NO
2. Citations and explanations (Rule 70.7)			
1	Reference is made to the following documents: (D1, D2) :		
	D1: EP-A-0 521 545 (GENERAL MOTORS CORP) 7 January 1993		
	D2: DE 199 50 222 A (ROBERT BOSCH GMBH) 26 April 2001		
2	<p>Document D1 is considered the prior art closest to the subject matter of independent claim 1 and discloses (the references between parentheses refer to that document) a method for monitoring a pulse charging valve (32) of an internal combustion engine (10) (see figure 1, the abstract and column 1, line 4 - line 43: the check valve shown in D1 functions as a "passive" pulse charging valve, since as a result of the pressure-controlled, brief closure of the intake pipe, reflected intake air pressure waves are used to increase the charging of the cylinders) comprising an accumulator (12), from which an intake pipe (26) leads to an intake (22) of a cylinder (16) of the internal combustion engine (10), a gas intake</p>		

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	<p>valve (24), which is arranged at the intake (22) of the cylinder (16), the pulse charging valve (32), which is arranged in the intake pipe (26) upstream of the gas intake valve (24) and depending on its selected position releases or closes the intake pipe (26), and a pressure sensor (44), which is arranged in the intake tract (12, 26, 28) and determines an intake pipe pressure. In document D1 the scanned intake pipe pressure values are used to calculate maximums or ratios of maximums and minimums, which are then compared with corresponding values of a reference intake pipe pressure which is characteristic of a predefined operating state of the pulse charging valve (32) (see figure 2(A)-(C) and column 2, line 33 - last line) and a fault in the pulse charging valve (32) being recognised as a function of the comparison; see column 7, line 49 - column 8, line 14.</p> <p>2.1 The subject matter of claim 1 thus differs from the known method in that in order to recognise a fault the pattern (MAP(t)) of the determined intake pipe pressure is compared with a reference intake pipe pressure.</p> <p>2.2 The subject matter of claim 1 is thus novel (PCT Article 33(2)).</p> <p>2.3 The current invention can be considered to address the problem of improving accuracy in fault recognition.</p>

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	<p>2.4 The solution to this problem as proposed in claim 1 of the present application involves an inventive step (PCT Article 33(3)). In D1 only one characteristic value is derived from the measured data for diagnosing the pulse charging valve (in D1 in the form of a check valve). Such a diagnostic method can be prone to a lot of errors, for example as a result of signal noise. The use of a (temporal) pattern of measuring points, which is used later in the method as a data record for a comparison of frequency spectra, produces a variety of measurement data which results in the method as per the current application being extremely significant. Such a pulse charging procedure is neither disclosed nor suggested by the prior art. The next question of interest is therefore that of whether a person skilled in the art would look at a technically neighbouring field in order to solve the problem of interest. In D2, for example, a frequency spectrum is determined from a measured fuel pressure pattern and is consulted together with a reference spectrum in order to provide diagnoses about the fuel system (see the abstract). However, the method disclosed in D2 is used, in particular, to provide diagnoses concerning a defective fuel pump (see figures 2-4 and column 5, line 37 - last line) and not in relation to a valve or the like. Also in D2 the measured value used is that of the fuel system pressure, which in the current application would correspond more to</p>

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	<p>the combustion chamber pressure and not to an intake pipe pressure upstream of the pulse charging valve. In view of these differences, a person skilled in the art would not be prompted to consult the teaching from D2 in order to modify the method specified in D1 in line with the subject matter of the current invention.</p> <p>2.5 The same reasoning applies to independent claim 10, the subject matter of which is therefore also novel (PCT Article 33(2)) and involves an inventive step (PCT Article 33(3)).</p> <p>2.6 Claims 2-9 are dependent on claim 1 and therefore likewise meet the PCT requirements for novelty and inventive step.</p>